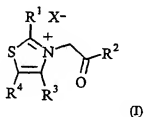


AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of the claims:

1. (Withdrawn): A composition for the treatment of hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to improve the biomechanical and diffusional characteristics comprising an effective amount of a compound selected from the group consisting of compounds of the formula (I):



wherein

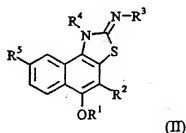
R¹ is a C₁-C₁₈ alkyl group-CH(R⁵)-OH, or the group -CH(R⁵)-OC(=O)-R⁶ wherein R₅ is a C₁₋₁₈ alkyl group and R₆ is selected from the group consisting of C₁-C₁₈ alkyl, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl and naphthyl; R₂ is selected from the group consisting of hydroxy, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, a C₃₋₇ aromatic, unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O and S; R₃ and R₄ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups;

and

X⁻ is halide or other pharmaceutically acceptable anion.

2. (Withdrawn): The composition of claim 1 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to the state found in a healthy 20 year old human.

3. (Withdrawn): A composition for the treatment of hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to improve the biomechanical and diffusional characteristics comprising an effective amount of a compound selected from the group consisting of compounds of the formula (II):

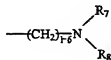


wherein

R^1 is selected from the group consisting of H, C_{1-3} lower alkyl, C_{1-18} lower alkanolyl, and aryl;

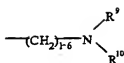
R_2 is selected from the group consisting of hydrogen and C_{1-3} lower alkyl;

R^3 is selected from the group consisting of lower alkyl, C_3C_8 cycloalkyl, phenyl, 1-[(animoinimomethyl)hydrazono]ethyl substituted phenyl, naphthyl, or aminoalkyl of the structure



wherein R^7 and R^8 are independently selected from the group consisting of hydrogen, C_1-C_6 alkyl, C_1-C_6 hydroxyalkyl, or R^7 and R^8 taken together with the nitrogen atom form a C_4-C_7 heterocyclic ring optionally containing one or two additional heteroatoms selected from the group consisting of N, O or sulfur;

R^4 is selected from the group consisting of methyl, lower alkyl, or aminoalkyl of structure



Wherein R^9 and R^{10} are independently selected from the group consisting of hydrogen,

$\text{C}_1\text{--C}_6$ alkyl, $\text{C}_1\text{--C}_6$ hydroxyalkyl, or R^9 and R^{10} taken together with the nitrogen

Atom form a $\text{C}_4\text{--C}_7$ heterocyclic ring optionally containing one or two additional

heteroatoms selected from the group consisting of N, O or sulfur; and

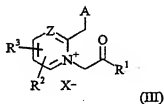
R^3 is selected from the group consisting of hydrogen, acetyl and 1-[(aminoiminomethyl)-

hydrazono]ethyl;

or hydrochloride salts thereof, or other pharmaceutically acceptable salts thereof.

4. (Withdrawn): The composition of claim 3 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the hair, nail, ex-vivo organ, ex-vivo cell, or ex-vivo tissue to the state found in a healthy 20 year old human.

5. (Withdrawn): A composition for the treatment of hair, nail, ex-vivo organ, ex-vivo cell, or ex-vivo tissue to improve the biomechanical and diffusional characteristics comprising an effective amount of a compound selected from the group consisting of compounds of formula (III):



wherein A is hydrogen, cyano, or a $\text{C}_6\text{--C}_{10}$ aryl group, said aryl groups optionally substituted by one or more lower alkyl, lower alkoxy, or halo groups;

Z is CH or N;

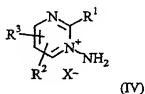
R¹ is hydroxy, C₁-C₁₈ alkoxy, amino optionally substituted with 1-2 independent C₁-C₁₈ alkyl groups, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy substituted phenyl, or a C₄₋₇ aromatic or unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O, or S, with the proviso that at least one heteroatom is nitrogen and said nitrogen is directly bonded to the carbonyl group; and

R² and R³ are independently selected from hydrogen, amino, or C₁-C₁₈ alkyl groups, or R² and R³ taken together may form a carbocyclic or heterocyclic ring, and

X⁻ is halide, or other pharmaceutically acceptable anion.

6. (Withdrawn): The composition of claim 5 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to the state found in a healthy 20 year old human.

7. (Withdrawn): A composition for the treatment of hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to improve the biomechanical and diffusional characteristics comprising an effective amount of a compound selected from the group consisting of compounds of formula (IV):



wherein R¹ is selected from:

amino,

methyl,

cyanomethyl,

the group -CH₂-A where A is a C₆-C₁₀ aryl group optionally substituted by one or more

lower alkyl, lower alkoxy or halo groups, or

the group -CH₂-C(=O)-Z where Z is selected from hydroxy, C₁-C₁₈ alkoxy, amino

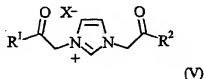
optionally substituted with 1-2C₁₋₁₈ alkyl groups, a C₆₋₁₀ aryl group optionally substituted by one or more lower alkyl or halo groups, or a C₄₋₇ aromatic or unsaturated or saturated heterocyclyl group having one to three heteroatoms selected from the group consisting of N, O, or S;

R² and R³ are independently selected from hydrogen, amino, lower alkoxy, or C1-C8 alkyl groups, or if R² and R³ are on adjacent atoms then R² and R³ taken together with their ring atoms may form a fused carbocyclic or heterocyclic ring; and

X- is mesitylene-2-sulfonate or other pharmaceutically acceptable anion.

8. (Withdrawn): The composition of claim 7 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to the state found in a health 20 year old human.

9. (Withdrawn): A composition for the treatment of hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to improve the biomechanical and diffusional characteristics comprising an effective amount of a compound selected from the group consisting of compounds of formula (V):



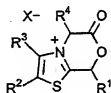
wherein

R¹ and R² are independently selected from hydroxy, lower alkoxy, amino optionally substituted with 1-2 lower alkyl groups, aryl, halosubstituted aryl, (lower alkyl) substituted aryl, or a C₃₋₇ unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O, and S and X- is halide, or other pharmaceutically acceptable anion.

10. (Withdrawn): The composition of claim 9 wherein the effective amount is

sufficient to return the biomechanical and diffusional characteristics of the hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to the state found in a healthy 20 year old human.

11. (Withdrawn): A composition for the treatment of hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to improve the biomechanical and diffusional characteristics comprising an effective amount of a compound selected from the group consisting of compounds of the formula:



wherein

R¹ and R⁴ are independently selected from hydrogen, phenyl or C₁-C₃ alkyl;

R² and R³ are independently selected from the group consisting of hydrogen, C₁-C₁₈

alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6

methylene units, or R² and R³ together with their ring atoms may be an

aromatic ring system of 6-10 carbons, optionally substituted with one or more

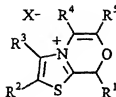
halo, lower alkyl, lower alkoxy, or amino groups;

and

X⁻ is a pharmaceutically acceptable anion such as halide.

12. (Withdrawn): The composition of claim 11 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to the state found in a healthy 20 year old human.

13. (Withdrawn): A composition for the treatment of hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to improve the biomechanical and diffusional characteristics comprising an effective amount of a compound selected from the group consisting of compounds of the formula:



wherein

R¹ and R⁴ are independently selected from hydrogen, phenyl or C₁-C₂ alkyl;

R² and R³ are independently selected from the group consisting of hydrogen, C₁-C₁₈ alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6 methylene units, or R² and R³ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups;

R⁵ is phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, or a C₅, aromatic or unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O and S; and

X is a pharmaceutically acceptable anion such as halide.

14. (Withdrawn): The composition of claim 13 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to the state found in a healthy 20 year old human.

15. (Withdrawn): A composition for the treatment of hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to improve the biomechanical and diffusional characteristics comprising an effective amount of a compound selected from the group of compounds of the formula:



wherein

R¹ is hydrogen, or -C(=O)-R⁶ wherein R⁶ is selected from the group consisting of C₁-C₁₈ alkyl, C₁-C₁₈ alkoxy, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl and naphthyl;

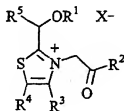
R² is hydrogen, phenyl or a C₁₋₅ alkyl group;

R³ and R⁴ and independently selected from the group consisting of hydrogen, C₁-C₁₈ alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6 methylene units, or R³ and R⁴ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups; and

X⁻ is mesitylene-2-sulfonate or other pharmaceutically acceptable anion.

16. (Withdrawn): The composition of claim 15 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the hair, nail, ex-vivo organ, ex-vivo cell or ex-vivo tissue to the state found in a healthy 20 year old human.

17. (Withdrawn): A compound of formula



wherein

R¹ is hydrogen, or -C(=O)-R⁶ wherein R⁶ is selected from the group consisting of C₁-C₁₈ alkyl, C₁-C₁₈ alkoxy, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl and naphthyl;

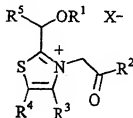
R² is hydrogen, phenyl or a C₁₋₅ alkyl group;

R³ and R⁴ and independently selected from the group consisting of hydrogen, C₁-C₁₈ alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6 methylene units, or R³ and R⁴ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups;

R⁵ is hydrogen, phenyl or C₁-C₅ alkyl group and;

X⁻ is a pharmaceutically acceptable anion such as halide.

18. (Withdrawn) A pharmaceutical composition for administration to an animal, comprising a pharmaceutically effective amount of a compound selected from the group consisting of formula



wherein

R¹ is hydrogen, or -C(=O)-R⁶ wherein R⁶ is selected from the group consisting of C₁-C₁₈ alkyl, C₁-C₁₈ alkoxy, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl and naphthyl;

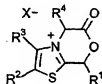
R² is hydrogen, phenyl or a C₁₋₅ alkyl group;

R³ and R⁴ are independently selected from the group consisting of hydrogen, C₁-C₁₈ alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6 methylene units, or R³ and R⁴ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups;

R⁵ is hydrogen, phenyl or C₁-C₃ alkyl group and;

X⁻ is a pharmaceutically acceptable anion such as halide.

19. (Withdrawn) A compound of the formula:

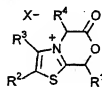


wherein

R¹ and R⁴ are independently selected from hydrogen, phenyl or C₁-C₃ alkyl;

R^2 and R^3 are independently selected from the group consisting of hydrogen, C_1 - C_{18} alkyl or hydroxyalkyl, or phenyl, or R^2 and R^3 together are a bridge of 3-6 methylene units, or R^2 and R^3 together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups; and X^- is a pharmaceutically acceptable anion such as halide.

20. (Withdrawn) A pharmaceutical composition for administration to an animal, comprising a pharmaceutically effective amount of a compound selected from the group consisting of formula

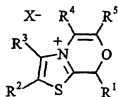


wherein

R^1 and R^4 are independently selected from hydrogen, phenyl or C_1 - C_5 alkyl;

R^2 and R^3 are independently selected from the group consisting of hydrogen, C_1 - C_{18} alkyl or hydroxyalkyl, or phenyl, or R^2 and R^3 together are a bridge of 3-6 methylene units, or R^2 and R^3 together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups; and X^- is a pharmaceutically acceptable anion such as halide.

21. (Withdrawn) A compound of the formula:



wherein

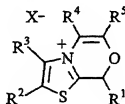
R^1 and R^4 are independently selected from hydrogen, phenyl or C_1 - C_5 alkyl;

R^2 and R^3 are independently selected from the group consisting of hydrogen, C_1 - C_{18} alkyl or hydroxyalkyl, or phenyl, or R^2 and R^3 together are a bridge of 3-6 methylene units, or R^2 and R^3 together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups;

R^5 is phenyl, halosubstituted phenyl, C_1 - C_{18} alkoxy-substituted phenyl, or C_{5-7} aromatic or unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O and S; and

X^- is a pharmaceutically acceptable anion such as halide.

22. (Withdrawn) A pharmaceutical composition for administration to an animal, comprising a pharmaceutically effective amount of a compound selected from the group consisting of formula



wherein

R^1 and R^4 are independently selected from hydrogen, phenyl or C_1 - C_5 alkyl;

R^2 and R^3 are independently selected from the group consisting of hydrogen, C_1 - C_{18} alkyl or hydroxyalkyl, or phenyl, or R^2 and R^3 together are a bridge of 3-6 methylene units, or R^2 and R^3 together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups;

R^5 is phenyl, halosubstituted phenyl, C_1 - C_{18} alkoxy-substituted phenyl, or C_{5-7} aromatic or unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O and S; and

X^- is a pharmaceutically acceptable anion such as halide.

23. (Withdrawn) A compound of the formula:



wherein

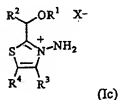
R¹ is hydrogen, or -C(=O)-R⁶ wherein R⁶ is selected from the group consisting of C₁-C₁₈ alkyl, C₁-C₁₈ alkoxy, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl and naphthyl;

R² is hydrogen, phenyl or a C₁₋₅ alkyl group;

R³ and R⁴ are independently selected from the group consisting of hydrogen, C₁-C₁₈ alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6 methylene units, or R³ and R⁴ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups; and

X⁻ is mesitylene-2-sulfonate or other pharmaceutically acceptable anion.

24. (Withdrawn) A pharmaceutical composition for administration to an animal, comprising a pharmaceutically effective amount of a compound selected from the group consisting of formula



wherein

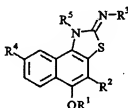
R¹ is hydrogen, or -C(=O)-R⁶ wherein R⁶ is selected from the group consisting of C₁-C₁₈ alkyl, C₁-C₁₈ alkoxy, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl and naphthyl;

R² is hydrogen, phenyl or a C₁₋₅ alkyl group;

R³ and R⁴ are independently selected from the group consisting of hydrogen, C₁-C₁₈ alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6 methylene units, or R³ and R⁴ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups; and

X⁻ is mesitylene-2-sulfonate or other pharmaceutically acceptable anion.

25 (Original): A compound of the formula of



wherein

R¹ is selected from the group consisting of H, C₁₋₃ lower alkyl, C₁₋₁₈ lower alkanoyl, and aroyl;

R² is selected from the group consisting of hydrogen and C₁₋₆ lower alkyl;

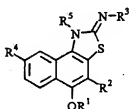
R³ is selected from the group consisting of lower alkyl, C₃₋₈ cycloalkyl, phenyl, 1-[(aminoiminomethyl)hydrazono]ethyl substituted phenyl, naphthyl, or the aminoalkyl group – A-NR⁶R⁷ wherein A is a straight or branched alkanediyl linker of 1-6 carbons and R⁶ and R⁷ are independently selected from the group consisting of hydrogen, C₁-C₆ alkyl, or C₁-C₆ hydroxyalkyl, or R⁶ and R⁷ taken together with the nitrogen atom form a C₄-C₇ heterocyclic ring optionally containing one or two additional heteroatoms selected from the group consisting of N, O, or sulfur;

R⁴ is selected from the group consisting of hydrogen, acetyl and 1-[(aminoiminomethyl)-hydrazono]ethyl; and

R⁵ is selected from the group consisting of hydrogen, C₁-C₆ alkyl, C₁-C₆ hydroxyalkyl, or aminoalkyl of structure –L-NR⁸R⁹ wherein L is a straight or branched alkanediyl linker of 1-6 carbons and R⁸ and R⁹ are independently selected from the group consisting of hydrogen, C₁-C₆ alkyl, C₁-C₆ hydroxyalkyl, or R⁸ and R⁹ taken together with the nitrogen atom form a C₄-C₇ heterocyclic ring optionally containing one or two additional heteroatoms selected from the group consisting of N, O, or sulfur; with the proviso that if R⁴ is hydrogen then R⁵ is –L-NR⁸N⁹ as defined above;

or hydrochloride salts thereof, or other pharmaceutically acceptable salts thereof.

26 (Original): A pharmaceutical composition for administration to an animal comprising a pharmaceutically effective amount of a compound selected from the group consisting of formula



wherein

R¹ is selected from the group consisting of H, C₁₋₅ lower alkyl, C₁₋₁₈ lower alkanoyl, and aryl;

R² is selected from the group consisting of hydrogen and C₁₋₆ lower alkyl;

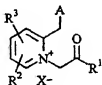
R³ is selected from the group consisting of lower alkyl, C₃₋₆ cycloalkyl, phenyl, 1-[(aminoiminomethyl)hydrazono]ethyl substituted phenyl, naphthyl, or the aminoalkyl group – A-NR⁶R⁷ wherein A is a straight or branched alkanediyl linker of 1-6 carbons and R⁶ and R⁷ are independently selected from the group consisting of hydrogen, C₁₋₆ alkyl, or C₁₋₆ hydroxyalkyl, or R⁶ and R⁷ taken together with the nitrogen atom form a C₄-C₇ heterocyclic ring optionally containing one or two additional heteroatoms selected from the group consisting of N, O, or sulfur;

R⁴ is selected from the group consisting of hydrogen, acetyl and 1-[(aminoiminomethyl)hydrazono]ethyl; and

R⁵ is selected from the group consisting of hydrogen, C₁₋₆ alkyl, C₁₋₆ hydroxyalkyl, or aminoalkyl of structure –L-NR⁸R⁹ wherein L is a straight or branched alkanediyl linker of 1-6 carbons and R⁸ and R⁹ are independently selected from the group consisting of hydrogen, C₁₋₆ alkyl, C₁₋₆ hydroxyalkyl, or R⁸ and R⁹ taken together with the nitrogen atom form a C₄-C₇ heterocyclic ring optionally containing one or two additional heteroatoms selected from the group consisting of N, O, or sulfur; with the proviso that if R⁴ is hydrogen then R⁵ is –L-NR⁸N⁹ as defined above;

or hydrochloride salts thereof, or other pharmaceutically acceptable salts thereof.

27. (Withdrawn): A compound of a formula



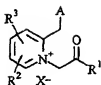
wherein

R¹ is selected from hydroxy, C₁-C₁₈ alkoxy, amino optionally substituted with 1-2 independent C₁-C₁₈ alkyl groups, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, or a heterocyclic group defined as a 5 to 10 membered aromatic or unsaturated or saturated heterocyclic system of 1-2 rings having one or more heteroatoms selected from the group consisting of N, O, or S;

A is selected from hydroxy, C₁-C₁₈ alkoxy, amino optionally substituted with 1-2 independent C₁-C₁₈ alkyl groups, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, a heterocyclyl group as defined for R¹ above with the proviso that the ring through which A is attached contains at least one heteroatom, or a group -C(=O)Z wherein Z is hydroxy, or Z is C₁-C₈ alkoxy, or Z is amino optionally substituted with 1-2 independent C₁-C₁₈ alkyl groups, or Z is heterocyclyl as defined for R¹ above; R² and R³ are independently selected from hydrogen, amino, or C₁-C₁₈ alkyl groups, or, if attached to adjacent ring positions, R² and R³ taken together may form a carbocyclic or heterocyclic ring; and

X⁻ is halide, preferably chloride or bromide, or other pharmaceutically acceptable anion; and at least one of R¹ or A or Z is a heterocyclyl group as defined for the respective groups above.

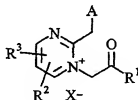
28. (Withdrawn): A pharmaceutical composition for administration to an animal, comprising a pharmaceutically effective amount of a compound selected from the group consisting of formula



wherein

- R^1 is selected from hydroxy, C_1 - C_{18} alkoxy, amino optionally substituted with 1-2 independent C_1 - C_{18} alkyl groups, phenyl, halosubstituted phenyl, C_1 - C_{18} alkoxy-substituted phenyl, or a heterocyclyl group defined as a 5 to 10 membered aromatic or unsaturated or saturated heterocyclic system of 1-2 rings having one or more heteroatoms selected from the group consisting of N, O, or S;
- A is selected from the group consisting of hydroxy, C_1 - C_3 hydroxyalkyl, cyano, phenyl, halosubstituted phenyl, C_1 - C_{18} alkoxy-substituted phenyl, a heterocyclyl group as defined for R^1 above with the proviso that the ring through which A is attached contains at least one heteroatom, or a group $-C(=O)Z$ wherein Z is hydroxy, or Z is C_1 - C_8 alkoxy, or Z is heterocyclyl as defined for R^1 above;
- R^2 and R^3 are independently selected from hydrogen, amino, or C_1 - C_{18} alkyl groups, or, if attached to adjacent ring positions, R^2 and R^3 taken together may form a carbocyclic or heterocyclic ring; and
- X⁻ is halide, preferably chloride or bromide, or other pharmaceutically acceptable anion; and at least one of R^1 or A or Z is a Heterocyclyl group as defined for the respective groups above.

29. (Withdrawn): A compound of formula



wherein

A is hydrogen, cyano, or a C₆-C₁₀ aryl group, said aryl groups optionally substituted by one or more lower alkyl, lower alkoxy, or halo groups;

Z is Ch or N;

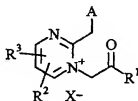
R¹ is hydroxy, C₁-C₁₈ alkoxy, amino optionally substituted with 1-2 independent C₁-C₁₈ alkyl groups, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, naphthyl, or a 4 to 10 membered aromatic heterocyclic or unsaturated heterocyclic or saturated heterocyclic ring system of 1 to 2 rings having one to three heteroatoms selected from the group consisting of N, O, and S;

R² and R³ are independently selected from hydrogen, amino, or C₁-C₁₈ alkyl groups, or R² and R³ taken together may form a carbocyclic or heterocyclic ring, and

X⁻ is halide, preferably chloride or bromide, or other pharmaceutically acceptable anion;

and if A is hydrogen, then R¹ is selected from phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, or a 4 to 10 membered aromatic heterocyclic or unsaturated heterocyclic or saturated heterocyclic ring system of 1 to 2 rings having one to three heteroatoms selected from the group consisting of N, O, and S.

30. (Withdrawn): A pharmaceutical composition for administration to an animal, comprising a



wherein

A is hydrogen, cyano, or a C₆-C₁₀ aryl group, said aryl groups optionally substituted by one or more lower alkyl, lower alkoxy, or halo groups;

Z is Ch or N;

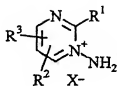
R¹ is hydroxy, C₁-C₁₈ alkoxy, amino optionally substituted with 1-2 independent C₁-C₁₈ alkyl groups, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, naphthyl, or a 4 to 10 membered aromatic heterocyclic or unsaturated heterocyclic or saturated heterocyclic ring system of 1 to 2 rings having one to three heteroatoms selected from the group consisting of N, O, and S;

R² and R³ are independently selected from hydrogen, amino, or C₁-C₁₈ alkyl groups, or R² and R³ taken together may form a carbocyclic or heterocyclic ring, and

X- is halide, preferably chloride or bromide, or other pharmaceutically acceptable anion;

and if A is hydrogen, then R¹ is selected from phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, or a 4 to 10 membered aromatic heterocyclic or unsaturated heterocyclic or saturated heterocyclic ring system of 1 to 2 rings having one to three heteroatoms selected from the group consisting of N, O, and S.

31. (Withdrawn): A compound of formula



wherein

R¹ is selected from:

amino,

methyl,

cyanomethyl,

the group $\text{-CH}_2\text{-A}$ where A is a $\text{C}_6\text{-C}_{10}$ aryl group optionally substituted by one or more

lower alkyl, lower alkoxy or halo groups, or

the group $\text{-CH}_2\text{-C(=O)-Z}$ where Z is selected from hydroxy, $\text{C}_1\text{-C}_{18}$ alkoxy, amino

optionally substituted with 1-2 $\text{C}_1\text{-C}_{18}$ alkyl groups, a $\text{C}_6\text{-C}_{10}$ aryl group

optionally substituted by one or more lower alkyl or halo groups, or a 4-10

membered aromatic heterocyclic or unsaturated heterocyclic or saturated

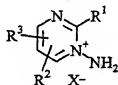
heterocyclic ring system of 1 to 2 rings having one to three heteroatoms selected

from the group consisting of N, O, or S;

R^1 and R^3 are independently selected from hydrogen, amino, $\text{C}_1\text{-C}_6$ alkoxy, or $\text{C}_1\text{-C}_8$ alkyl groups, or if R^2 and R^3 are on adjacent atoms then R^2 and R^3 taken together with their ring atoms may form a fused carbocyclic or heterocyclic ring; and

X^- is mesitylene-2-sulfonate or other pharmaceutically acceptable anion.

32. (Withdrawn): A pharmaceutical composition for administration to an animal comprising a pharmaceutically effective amount of a compound selected from the group consisting of formula



wherein

R^1 is selected from:

amino,

methyl,

cyanomethyl,

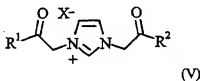
the group $\text{-CH}_2\text{-A}$ where A is a $\text{C}_6\text{-C}_{10}$ aryl group optionally substituted by one or more

lower alkyl, lower alkoxy or halo groups, or
the group $-\text{CH}_2\text{C}(=\text{O})-\text{Z}$ where Z is selected from hydroxy, $\text{C}_1\text{-C}_{18}$ alkoxy, amino
optionally substituted with 1-2 $\text{C}_1\text{-C}_{18}$ alkyl groups, a $\text{C}_6\text{-C}_{10}$ aryl group
optionally substituted by one or more lower alkyl or halo groups, or a 4-10
membered aromatic heterocyclic or unsaturated heterocyclic or saturated
heterocyclic ring system of 1 to 2 rings having one to three heteroatoms selected
from the group consisting of N, O, or S;

R^2 and R^3 are independently selected from hydrogen, amino, $\text{C}_1\text{-C}_6$ alkoxy, or $\text{C}_1\text{-C}_6$ alkyl
groups, or if R^2 and R^3 are on adjacent atoms then R^2 and R^3 taken together with their ring atoms
may form a fused carbocyclic or heterocyclic ring; and

X- is mesitylene-2-sulfonate or other pharmaceutically acceptable anion.

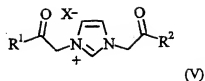
33. (Withdrawn): A compound of the formula



wherein

R^1 and R^2 are independently selected from hydroxy, $\text{C}_1\text{-C}_{18}$ alkoxy, amino optionally
substituted with 1-2 independent alkyl groups of 1-8 carbons, aryl, halosubstituted aryl,
(lower alkyl) substituted aryl, or a heterocycl group defined as 4 to 10 membered
aromatic heterocyclic or unsaturated heterocyclic or saturated heterocyclic ring system
of 1 to 2 rings having one to three heteroatoms selected from the group consisting of N,
O, and S, with the proviso that one of R^1 or R^2 must be optionally substituted amino
group or heterocyclyl group as defined above; and
X- is halide, preferably chloride or bromide, or other pharmaceutically acceptable anion.

34. (Withdrawn): A pharmaceutical composition for administration to an animal
comprising a pharmaceutically effective amount of a compound selected from the group
consisting of formula



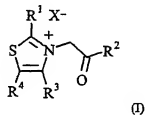
wherein

R¹ and R² are independently selected from hydroxy, C₁-C₁₈ alkoxy, amino optionally

substituted with 1-2 independent alkyl groups of 1-8 carbons, aryl, halosubstituted aryl, (lower alkyl) substituted aryl, or a heterocycl group defined as 4 to 10 membered aromatic heterocyclic or unsaturated heterocyclic or saturated heterocyclic ring system of 1 to 2 rings having one to three heteroatoms selected from the group consisting of N, O, and S, with the proviso that one of R¹ or R² must be optionally substituted amino group or heterocyclyl group as defined above; and

X- is halide, preferably chloride or bromide, or other pharmaceutically acceptable anion.

35. (Withdrawn): A method comprising in vivo treating of a target biomaterial with an effective amount of a composition to improve the biomechanical and diffusional characteristics of the biomaterial, wherein the composition comprises a compound selected from the group consisting of compounds of the formual (I):



wherein

R¹ is a C₁-C₁₈ alkyl group-CH(R⁵)-OH, or the group -CH(R⁵)-OC(=O)-R⁶ wherein R₅ is a C₁-₁₈ alkyl group and R₆ is selected from the group consisting of C₁-C₁₈ alkyl, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl and naphthyl; R₂ is selected from the group consisting of hydroxy, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, a C₃₋₇ aromatic, unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O and S; R₃ and R₄ together with their ring atoms may be an aromatic

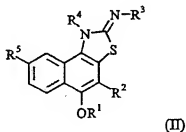
ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups;

and

X⁻ is halide or other pharmaceutically acceptable anion.

36. (Withdrawn): The method of claim 35 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the biomaterial to the state found in a healthy 20 year old human.

37. (Withdrawn): A method comprising in vivo treating of a target biomaterial with an effective amount of a composition to improve the biomechanical and diffusional characteristics of the biomaterial, wherein the composition comprises a compound selected from the group consisting of compounds of the formal (II):



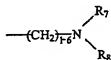
wherein

R¹ is selected from the group consisting of H, C₁₋₅ lower alkyl, C₁₋₁₈ lower alkanoyl, and aryl;

R² is selected from the group consisting of hydrogen and C₁₋₅ lower alkyl;

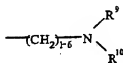
R³ is selected from the group consisting of lower alkyl, C₃₋₈ cycloalkyl, phenyl, 1-

[(aminoiminomethyl)hydrazono]ethyl substituted phenyl, naphthyl, or aminoalkyl
of the structure



wherein R⁷ and R⁸ are independently selected from the group consisting of hydrogen, C₁-C₆ alkyl, C₁-C₆ hydroxyalkyl, or R⁷ and R⁸ taken together with the nitrogen atom form a C₄-C₇ heterocyclic ring optionally containing one or two additional heteroatoms selected from the group consisting of N, O or sulfur;

R⁴ is selected from the group consisting of methyl, lower alkyl, or aminoalkyl of structure



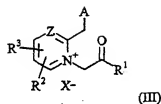
wherein R⁹ and R¹⁰ are independently selected from the group consisting of hydrogen, C₁-C₆ alkyl, C₁-C₆ hydroxyalkyl, or R⁹ and R¹⁰ taken together with the nitrogen Atom form a C₄-C₇ heterocyclic ring optionally containing one or two additional heteroatoms selected from the group consisting of N, O or sulfur; and

R³ is selected from the group consisting of hydrogen, acetyl and 1-[(aminoiminomethyl)-hydrazono]ethyl;
or hydrochloride salts thereof, or other pharmaceutically acceptable salts thereof.

38. (Withdrawn): The method of claim 37 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the biomaterial to the state found in a healthy 20 year old human.

39. (Withdrawn): A method comprising in vivo treating of a target biomaterial with an effective amount of a composition to improve the biomechanical and diffusional characteristics of the biomaterial, wherein the composition comprises a compound selected from the group

consisting of compounds of the formula (III):



wherein A is hydrogen, cyano, or a C₆-C₁₀ aryl group, said aryl groups optionally substituted by one or more lower alkyl, lower alkoxy, or halo groups;

Z is CH or N;

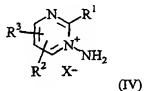
R¹ is hydroxy, C₁-C₁₈ alkoxy, amino optionally substituted with 1-2 independent C₁-C₁₈ alkyl groups, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, or a C₄₋₇ aromatic or unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O, or S, with the proviso that at least one heteroatom is nitrogen and said nitrogen is directly bonded to the carbonyl group; and

R² and R³ are independently selected from hydrogen, amino, or C₁-C₁₈ alkyl groups, or R² and R³ taken together may form a carbocyclic or heterocyclic ring, and

X⁻ is halide, or other pharmaceutically acceptable anion.

40. (Withdrawn): The method of claim 39 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the biomaterial to the state found in a healthy 20 year old human.

41. (Withdrawn): A method comprising in vivo treating of a target biomaterial with an effective amount of a composition to improve the biomechanical and diffusional characteristics of the biomaterial, wherein the composition comprises a compound selected from the group consisting of compounds of the formula (IV):



wherein R1 is selected from:

amino,

methyl,

cyanomethyl,

the group -CH₂-A where A is a C₆-C₁₀ aryl group optionally substituted by one or more

lower alkyl, lower alkoxy or halo groups, or

the group -CH₂-C(=O)-Z where is selected from hydroxy, C₁-C₁₈ alkoxy, amino

optionally substituted with 1-2C₁-C₁₈ alkyl groups, a C₆-C₁₀ aryl group

optionally substituted by one or more lower alkyl or halo groups, or a C₄₋₇

aromatic or unsaturated or saturated heterocyclyl group having one to three

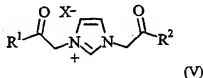
heteroatoms selected from the group consisting of N, O, or S;

R² and R³ are independently selected from hydrogen, amino, lower alkoxy, or C₁-C₈ alkyl groups, or if R² and R³ are on adjacent atoms then R² and R³ taken together with their ring atoms may form a fused carbocyclic or heterocyclic ring; and

X- is mesitylene-2-sulfonate or other pharmaceutically acceptable anion.

42. (Withdrawn): The method of claim 42 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the biomaterial to the state found in a healthy 20 year old human.

43. (Withdrawn): A method comprising in vivo treating of a target biomaterial with an effective amount of a composition to improve the biomechanical and diffusional characteristics of the biomaterial, wherein the composition comprises a compound selected from the group consisting of compounds of the formal (V):

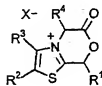


wherein

R¹ and R² are independently selected from hydroxy, lower alkoxy, amino optionally substituted with 1-2 lower alkyl groups, aryl, halosubstituted aryl, (lower alkyl) substituted aryl, or a C₅₋₇ unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O, and S and X- is halide, or other pharmaceutically acceptable anion.

44. (Withdrawn): The method of claim 43 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the biomaterial to the state found in a healthy 20 year old human.

45. (Withdrawn): A method comprising in vivo treating of a target biomaterial with an effective amount of a composition to improve the biomechanical and diffusional characteristics of the biomaterial, wherein the composition comprises a compound selected from the group consisting of compounds of the formula:



wherein

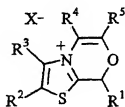
R¹ and R⁴ are independently selected from hydrogen, phenyl or C₁-C₅ alkyl;

R² and R³ are independently selected from the group consisting of hydrogen, C₁-C₁₈ alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6 methylene units, or R² and R³ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups; and

X⁻ is a pharmaceutically acceptable anion such as halide.

46. (Withdrawn): The method of claim 45 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the biomaterial to the state found in a healthy 20 year old human.

47. (Withdrawn): A method comprising in vivo treating of a target biomaterial with an effective amount of a composition to improve the biomechanical and diffusional characteristics of the biomaterial, wherein the composition comprises a compound selected from the group consisting of compounds of the formula:



wherein

R¹ and R⁴ are independently selected from hydrogen, phenyl or C₁-C₅ alkyl;

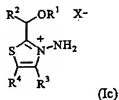
R² and R³ are independently selected from the group consisting of hydrogen, C₁-C₁₈ alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6 methylene units, or R² and R³ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups;

R⁵ is phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl, or C₅₋₇ aromatic or unsaturated or saturated heterocyclic ring having one to three heteroatoms selected from the group consisting of N, O and S; and

X⁻ is a pharmaceutically acceptable anion such as halide.

48. (Withdrawn): The method of claim 47 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the biomaterial to the state found in a healthy 20 year old human.

49. (Withdrawn): A method comprising in vivo treating of a target biomaterial with an effective amount of a composition to improve the biomechanical and diffusional characteristics of the biomaterial, wherein the composition comprises a compound selected from the group consisting of compounds of the formula:



wherein

R¹ is hydrogen, or -C(=O)-R⁶ wherein R⁶ is selected from the group consisting of C₁-C₁₈ alkyl, C₁-C₁₈ alkoxy, phenyl, halosubstituted phenyl, C₁-C₁₈ alkoxy-substituted phenyl and naphthyl;

R² is hydrogen, phenyl or a C₁₋₃ alkyl group;

R³ and R⁴ are independently selected from the group consisting of hydrogen, C₁-C₁₈ alkyl or hydroxyalkyl, or phenyl, or R² and R³ together are a bridge of 3-6 methylene units, or R³ and R⁴ together with their ring atoms may be an aromatic ring system of 6-10 carbons, optionally substituted with one or more halo, lower alkyl, lower alkoxy, or amino groups; and

X⁻ is mesitylene-2-sulfonate or other pharmaceutically acceptable anion.

50. (Withdrawn): The method of claim 49 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the biomaterial to the state found in a healthy 20 year old human.

51. (Withdrawn): The method of claim 35 wherein the effective amount is sufficient to improve the biomechanical and diffusional characteristics of the biomaterial by at least about a 20% uncoupling activity after 1 day as measured by Assay of Uncoupling Activity test method.

52. (Withdrawn): The method of claim 37 wherein the effective amount is sufficient to improve the biomechanical and diffusional characteristics of the biomaterial by at least about a

20% uncoupling activity after 1 day as measured by Assay of Uncoupling Activity test method.

53. (Withdrawn): The method of claim 39 wherein the effective amount is sufficient to improve the biomechanical and diffusional characteristics of the biomaterial by at least about a 20% uncoupling activity after 1 day as measured by Assay of Uncoupling Activity test method.

54. (Withdrawn): The method of claim 41 wherein the effective amount is sufficient to improve the biomechanical and diffusional characteristics of the biomaterial by at least about a 20% uncoupling activity after 1 day as measured by Assay of Uncoupling Activity test method.

55. (Withdrawn): The method of claim 43 wherein the effective amount is sufficient to improve the biomechanical and diffusional characteristics of the biomaterial by at least about a 20% uncoupling activity after 1 day as measured by Assay of Uncoupling Activity test method.

56. (Withdrawn): The method of claim 45 wherein the effective amount is sufficient to improve the biomechanical and diffusional characteristics of the biomaterial by at least about a 20% uncoupling activity after 1 day as measured by Assay of Uncoupling Activity test method.

57. (Withdrawn): The method of claim 47 wherein the effective amount is sufficient to improve the biomechanical and diffusional characteristics of the biomaterial by at least about a 20% uncoupling activity after 1 day as measured by Assay of Uncoupling Activity test method.

58. (Withdrawn): The method of claim 49 wherein the effective amount is sufficient to improve the biomechanical and diffusional characteristics of the biomaterial by at least about a 20% uncoupling activity after 1 day as measured by Assay of Uncoupling Activity test method.

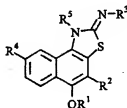
59. (Withdrawn): A compound selected from the group consisting of 1,2-dihydro-1-[3-(dimethylamino)propyl]-4-methyl-2-(phenylamino)naphtho[1,2-*d*]thiazol-5-ol; 2-cyclohexylamino)-1,2-dihydro-4-methyl-1-[3-(4-morpholino)propyl]naphtho[1,2-*d*]thiazol-5-ol;

2-[[3-(dimethylamino)propyl]imino]-1,2-dihydro-1,4-dimethylnaphthol[1,2-*d*]thiazol-5-ol; 2-(cyclohexylamino)-1,2-dihydro-4-methyl-1-[3-(dimethylamino)propyl]naphthol[1,2-*d*]thiazol-5-ol, and pharmaceutically acceptable salts thereof.

60. (Withdrawn): A compound of 1-[2-(1-pyrrolidinyl)-2-oxoethyl]-2-(cyanomethyl)pyridinium and pharmaceutically acceptable salts thereof.

61. (Withdrawn): A compound of 5,6-dihydro-8-methyl-6-oxo-8*H*-thiazol[2,3-*c*](1,4)oxazin-4-ium and pharmaceutically acceptable salts thereof.

62. (Added): A method comprising in vivo treating a target biomaterial with an effective amount of a composition to improve the biomechanical and diffusional characteristics of a biomaterial, wherein the composition comprises a compound selected from the group consisting of compounds of the formula:



wherein

R¹ is selected from the group consisting of H, C₁₋₃ lower alkyl, C₁₋₁₈ lower alkanoyl, and aryl;

R² is selected from the group consisting of hydrogen and C₁₋₆ lower alkyl;

R³ is selected from the group consisting of lower alkyl, C₃₋₆ cycloalkyl, phenyl, 1-[(aminoiminomethyl)hydrazono]ethyl substituted phenyl, naphthyl, or the aminoalkyl group – A-NR⁶R⁷ wherein A is a straight or branched alkanediyl linker of 1-6 carbons and R⁶ and R⁷ are independently selected from the group consisting of hydrogen, C₁₋₆ alkyl, or C₁₋₆ hydroxyalkyl, or R⁶ and R⁷ taken together with the nitrogen atom form a C₄₋₇ heterocyclic ring optionally containing one or two additional heteroatoms selected from the group consisting of N, O, or sulfur;

R⁴ is selected from the group consisting of hydrogen, acetyl and 1-[(aminoiminomethyl)-

hydrazono]ethyl; and

R² is selected from the group consisting of hydrogen, C₁-C₆ alkyl, C₁-C₆ hydroxyalkyl, or aminoalkyl of structure -L-NR⁸R⁹ wherein L is a straight or branched alkanediyl linker of 1-6 carbons and R⁸ and R⁹ are independently selected from the group consisting of hydrogen, C₁-C₆ alkyl, C₁-C₆ hydroxyalkyl, or R⁸ and R⁹ taken together with the nitrogen atom form a C₄-C₇ heterocyclic ring optionally containing one or two additional heteroatoms selected from the group consisting of N, O, or sulfur; with the proviso that if R⁴ is hydrogen then R² is -L-NR⁸N⁹ as defined above;

or hydrochloride salts thereof, or other pharmaceutically acceptable salts thereof.

63. (Added): The method of claim 62 wherein the effective amount is sufficient to return the biomechanical and diffusional characteristics of the biomaterial to the state found in a healthy 20 year old human.

64. (Added): The method of claim 62 wherein the effective amount is sufficient to improve the biomechanical and diffusional characteristics of the biomaterial by at least about a 20% uncoupling activity after 1 day as measured by Assay of Uncoupling Activity test method.